



Office of Energy Efficiency  
and Renewable Energy

**GT** OFFICE OF  
TRANSPORTATION  
TECHNOLOGIES  
**Success Stories**

# \$10/kW Bipolar Separator Plate for Fuel Cells

## Background

The bipolar separator plate is one of the most expensive components in the polymer electrolyte membrane fuel cell (PEMFC). The cost of a fuel-cell stack system must be less than \$35 per kilowatt (kW) to become a commercial success in automobile use.

The U.S. Department of Energy (DOE) is sponsoring a program with the Institute of Gas Technology (IGT) to develop a molded composite graphite bipolar plate that is inexpensive and performs as well as machined graphite bipolar plates.

IGT has developed a \$10/kW material and fabrication process in which channels are molded directly into the plate. No post-molding finishing or machining steps are needed, and essentially any plate design configuration is possible. Because of the flexibility of the composite molded parts, much thinner plates are possible than with machined graphite.

## Accomplishments

- ◆ IGT and its subcontractors, Stimsonite and Superior Graphite, have developed molded composite bipolar separator plates that
  - Exceed all DOE requirements for conductivity, chemical, and physical stability.
  - Have shown performance and endurance equivalent to those of traditional machined graphite.
  - Have been scaled up from 60-cm<sup>2</sup> to 300-cm<sup>2</sup> active area.
- ◆ Stimsonite and ENDESCO Services have formed a new company, PEM Plates, to mold PEMFC bipolar plates for developers worldwide. PEM Plates is supplying plates to AlliedSignal for testing and is seeking customers to begin the first phase of its pilot molding operation.

## Benefits

- ◆ The low-cost \$10/kW separator plates could bring fuel cells for vehicle use to market sooner.

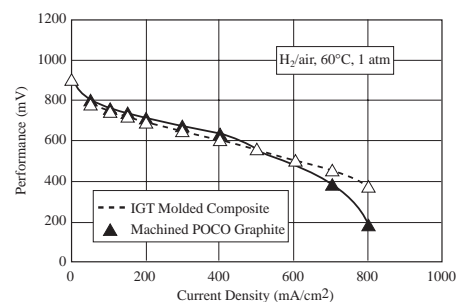


*Bipolar Separator Plate Active Area*

- ◆ The molded plate process and materials are amenable to high-volume manufacturing.
- ◆ The properties of the molded composite plates allow more compact, lighter fuel-cell stacks.
- ◆ The flexibility of the molded composite plates result in a more durable and rugged stack.
- ◆ Use of molded composite plates in other applications will create demand and increase production rates, resulting in further cost reductions.

## Future Activities

- ◆ Validate molding process at the pilot manufacturing level.
- ◆ Conduct molding trials with developer designs.
- ◆ Conduct additional stack endurance and verification testing.
- ◆ Obtain orders from developers to reach production levels needed for further cost reductions.



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## Partners in Success

Institute of Gas Technology  
ENDESCO Services, Inc.  
Stimsonite Corporation  
PEM Plates, LLC  
Superior Graphite Corporation  
AlliedSignal, Inc.

## Contact

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